



SNS COLLEGE OF ENGINEERING

Kurumbapalayam (Po), Coimbatore – 641 107

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Approved by AICTE, New Delhi & Affiliated to Anna University, Chennai



DEPARTMENT OF ARTIFICIAL INTELLIGENCE AND DATA SCIENCE

COURSE NAME : 23ITT101- PROBLEM SOLVING & C PROGRAMMING

I YEAR /I SEMESTER

Unit II – ARRAYS AND STRINGS

Topic : Matrix Multiplication



Matrix Multiplication

- Matrix multiplication is an operation that produces a matrix from two matrices, where the number of columns in the first matrix must equal the number of rows in the second matrix. Each element of the resulting matrix is computed as the dot product of the corresponding row from the first matrix and the corresponding column from the second matrix.



Matrix Multiplication

$$\begin{bmatrix} a & b \\ c & d \end{bmatrix} \times \begin{bmatrix} i & j \\ k & l \end{bmatrix} = \begin{bmatrix} a.i + b.k & a.j + b.l \\ c.i + d.k & c.j + d.l \end{bmatrix}$$



Example: Matrix Multiplication



```
// matrix addition
#include <stdio.h>

int main() {
    int r, c, a[10][10], b[10][10], mul[10][10], i, j;
    printf("Enter the number of rows (between 1 and 10): ");
    scanf("%d", &r);
    printf("Enter the number of columns (between 1 and 10): ");
    scanf("%d", &c);
    mul[i][j]=0;
    printf("\nEnter %d elements of 1st matrix:\n",r*c);
    for (i = 0; i < r; ++i)
        for (j = 0; j < c; ++j) {
            scanf("%d", &a[i][j]);
        }
    printf("Enter %d elements of 2nd matrix:\n",r*c);
    for (i = 0; i < r; ++i)
        for (j = 0; j < c; ++j) {
            scanf("%d", &b[i][j]);
        }
}
```

```
printf("multiply of the matrix=\n");
for(i=0;i<r;i++)
{
    for(j=0;j<c;j++)
    {
        for(k=0;k<c;k++)
        {
            mul[i][j]+=a[i][k]*b[k][j];
        }
    }
}
//for printing result
for(i=0;i<r;i++)
{
    for(j=0;j<c;j++)
    {
        printf("%d\t",mul[i][j]);
    }
    printf("\n");
}
return 0;
}
```

Output:

```
Enter number of rows (between 1 and 10): 2
Enter the number of columns (between 1 and 10): 2

Enter 6 elements of 1st matrix:
1 2
3 4

Enter 6 elements of 2nd matrix:
5 6
7 8

multiply of the matrix=
19 22
43 50
```

